

7-8 Inverse Functions and Relations

ex:
 $y = 3x$

(1,) 3
 (2,) 6

Change equation so that you would
 get (3, 1) and (6, 2).

$$y = \frac{1}{3}x$$

ex:

$$y = x + 5$$

(1,) 6

(2,) 7

$$y = x - 5$$

(6, 1)

(7, 2)

ex:

$$y = 3x - 1$$

(0,) -1

(2,) 5

$$y = \frac{x+1}{3}$$

(-1, 0)

(5, 2)

These equations are inverses of one
 another
 (switching of x and y)

Using function notation:

$$f(x) = 3x - 1$$

$$f^{-1}(x) = \frac{x+1}{3}$$

"f inverse of x"

$$f(0) = -1$$

$$f^{-1}(-1) = 0$$

$$f(2) = 5$$

$$f^{-1}(5) = 2$$

If $f(a) = b$, then $f^{-1}(b) = a$.

Given the relation:

$$\{(3, 3) (2, 5) (-2, 5) (-2, 2) (-1, 2) (-1, 3)\}$$

Find the inverse relation.

$$\{(3, 3) (5, 2) (5, -2) (2, -2) (2, -1) (3, -1)\}$$

Finding the inverse.

ex:

$$f(x) = \frac{-1}{2}x + 1$$

$$y = -\frac{1}{2}x + 1$$

$$x = -\frac{1}{2}y + 1$$

$$\begin{aligned} x - 1 &= -\frac{1}{2}y \\ -2x + 2 &= y \end{aligned}$$

1. change to $y =$ 2. switch x and y 3. solve for y 4. change to $f^{-1}(x) =$

$$f^{-1}(x) = -2x + 2$$

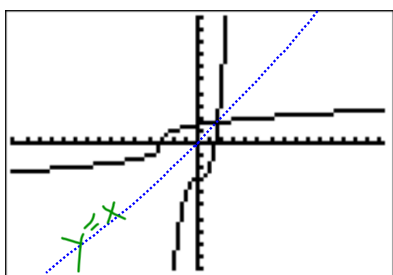
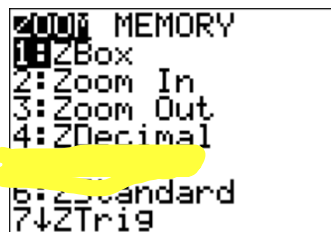
Find the inverse:

$$1. f(x) = x - \frac{3}{4} \quad f^{-1}(x) = \frac{4}{3}x + 8$$

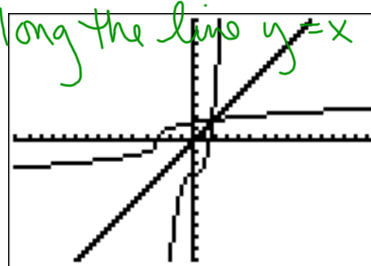
$$2. g(x) = \frac{x+2}{3} \quad f^{-1}(x) = 3x - 2$$

$$3. f(x) = x^3 - 3 \quad f^{-1}(x) = \sqrt[3]{x+3}$$

After finding the inverse, graph #3 and the inverse on your calc



A fn. & its inverse are symm.
along the line $y=x$



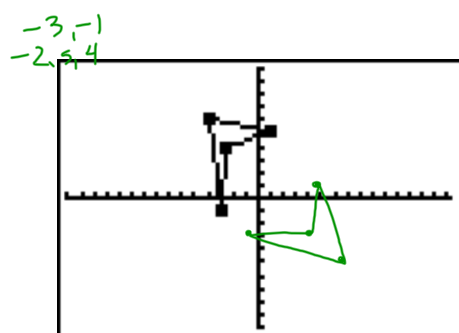
Graph the relation and its inverse:

$\{(1, 5) (-4, 6) (-3, -1) (-2.5, 4)\}$

L1	L2	L3	3
-4	6		
-2.5	4		
L3(t)=			

Plot1	Plot2	Plot3
Off		
Type:		
Xlist:	L1	
Ylist:	L2	
Mark:		

2000 MEMORY
 1:ZBox
 2:Zoom In
 3:Zoom Out
 4:ZDecimal
 5:ZStandard
 7:ZTrig

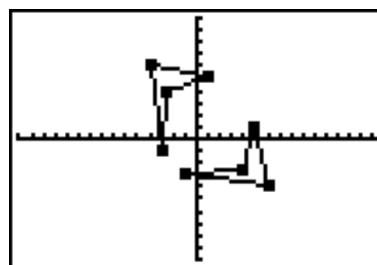


Plot1	Plot2	Plot3
Off		
Type:		
Xlist:		
Ylist:		
Mark:		

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ZOOM MEMORY
1:ZBox
2:Zoom In
3:Zoom Out
4:ZDecimal
5:ZStandard
6:ZTrig

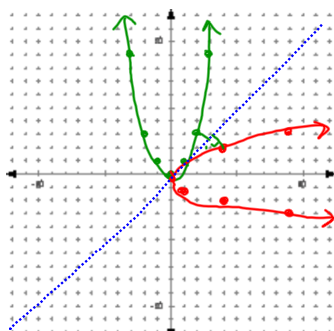
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Sketch the inverse.

$$y = x^2$$

$(0,0)$
 $(1,1)$
 $(2,4)$



Show that two functions are inverses of one another

Two functions are inverses of each other iff the composition is the identity function.

$$f(g(x)) = x$$

$$[f \circ g](x) = x$$

$$[g \circ f](x) = x$$

Show $f(x) = \frac{-1}{x+1}$ $g(x) = -2x + 2$ are inverses.

$$[f \circ g](x) = x$$

$$f(-2x+2)$$

$$-\frac{1}{2}(-2x+2)+1$$

$$x - 1 + 1$$

$$x = x \checkmark$$

$$[g \circ f](x) = x$$

$$-2\left(-\frac{1}{2}x+1\right)+2$$

$$x - 2 + 2$$

$$x = x \checkmark$$

HW p393

15-27 odd

32, 33